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Presentation Abstract

Title Thermal Properties Of Unusual Local-scale Features On Vesta

Author Federico Tosi¹, M. Capria¹, M. De Sanctis¹, E. Palomba¹, D. Grassi¹, F. Capaccioni¹, E.
Block Ammannito¹, J. Combe², J. M. Sunshine³, T. N. Titus⁴, D. W. Mittlefehldt⁵, J. Li³, C. T.
Russell⁶, C. A. Raymond⁷

¹INAF-IAPS, Rome, Italy, ²Bear Fight Institute, ³University of Maryland, ⁴U.S. Geological Survey, ⁵NASA Johnson Space Center, ⁶University of California at Los Angeles, ⁷NASA/Jet Propulsion Laboratory and California Institute of Technology.

Abstract On Vesta, the thermal behavior of areas of unusual albedo seen at the local scale can be related to physical properties that can provide information about the origin of those materials. We used Dawn's Visible and Infrared Mapping Spectrometer (VIR) hyperspectral cubes to retrieve surface temperatures and emissivities, with high accuracy as long as temperatures are greater than ~180 K. Data acquired in the Survey phase (23 July through 29 August 2011) show several unusual surface features: 1) high-albedo (bright) and low-albedo (dark) material deposits, 2) spectrally distinct ejecta and 'pitted' materials, 3) regions suggesting finer-grained materials. Some of the unusual dark and bright features were re-observed by VIR in the subsequent High-Altitude Mapping Orbit (HAMO) and Low-Altitude Mapping Orbit (LAMO) phases at increased pixel resolution. In this work we present temperature maps and emissivities of several local-scale features that were observed by Dawn under different illumination conditions and different local solar times. Data from VIR's IR channel show that bright regions generally correspond to regions with lower thermal emission, i.e. lower temperature, while dark regions correspond to areas with higher thermal emission, i.e. higher temperature. This behavior confirms that many of the dark appearances in the VIS mainly reflect albedo variations, and not, for example, shadowing. During maximum daily insolation, dark features in the equatorial region may rise to temperatures greater than 270 K, while brightest features stop at roughly 258 K, local solar time being similar. However, 'pitted' materials, showing relatively low reflectance, have significantly lower temperatures, as a result of differences in composition and/or structure (e.g. average grain size of the surface regolith, porosity, etc.). To complement this work, we provide preliminary values of thermal inertia for some bright and dark features.